Technical Note: Determination of the metabolically active fraction of benthic foraminifera by means of Fluorescent In Situ Hybridization (FISH)

Titre	Technical Note: Determination of the metabolically active fraction of benthic foraminifera by means of Fluorescent In Situ Hybridization (FISH)
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Résumé en anglais	Benthic foraminifera are an important component of the marine biota, but protocols for investigating their viability and metabolism are still extremely limited. Classical studies on benthic foraminifera have been based on direct counting under light microscopy. Typically, these organisms are stained with Rose Bengal, which binds proteins and other macromolecules, but does not allow discrimination between viable and recently dead organisms. The fluorescent in situ hybridization technique (FISH) represents a new and useful approach to identify living cells possessing an active metabolism. Our work is the first test of the suitability of the FISH technique, based on fluorescent probes targeting the 18S rRNA, to detect live benthic foraminifera. The protocol was applied on Ammonia group and Miliolids, as well as on agglutinated polythalamous (i.e., Leptohalysis scottii and Eggerella scabra) and soft-shelled monothalamous (i.e., Psammophaga sp. and saccamminid morphotypes) taxa. The results from FISH analyses were compared with those obtained, on the same specimens assayed with FISH, from microscopic analysis of the cytoplasm colour, presence of pigments and pseudopodial activity. Our results indicate that FISH targets only metabolically active foraminifera, and allows discerning from low to high cellular activity, validating the hypothesis that the intensity of the fluorescent signal emitted by the probe is dependent upon the physiological status of cells. These findings support the usefulness of this molecular approach as a key tool for obtaining information on the physiology of living foraminifera, both in field and experimental settings.
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